the present volume contains the records of the first year's journey along both slopes of the Tian-shan, in the oases of Guchen, Hami and Turfan. Starting from the Russian Turkestan town, Jarkent, the expedition went first to Kulja, whence they crossed the Eastern Tian-shan, named Boro-khoro in that portion of it. To do this, they went up the steep and 8500 feet high Tsiterty, or Achal Pass, from which most beautiful views open on Lake Ebi-nor, and where the chain falls most abruptly northwards to the sandy deserts surrounding the now rapidly desiccating lake, whose altitude is only 700 feet. Then the explorers made a series of unsuccessful attempts at recrossing the Boro-khoro Mountains from north to south. Although the Torgoutes, and next the Chinese, tried to dissuade them from such a venture, they went, nevertheless, up one of the tributaries of Lake Ebi-nor, but were soon compelled to return. In their middle courses, the streams which flow from the great chain run through remarkable cañons deeply cut in diluvial deposits, and in their upper courses the cañons become mere rents between high cliffs, through which the water, rapidly rising from the melted snow, rushes as a torrent. Compelled to return, the party explored the northern spurs of the Borokhoro, vainly looking for another pass, as they slowly moved east, towards the oases of Manas and Urumchi. From this last oasis they visited the beautiful group of the snow-clad holy mountains, Bogdo-ola, which raise their peaks above a picturesque alpine lake. One fully realises, on reading the travellers' description of these forest-clad mountains, covered with glaciers, and intersected with cool alpine valleys, while barren deserts surround them, why they are so much venerated by the Mongols and considered as the seat of deity.

From the next oasis, Guchen, the party made an incursion into the sandy Dzungarian desert, and there secured at last, with no little difficulty, two specimens of the Wild Horse (*Equus przewalskii*, Poljakoff), for which Prjevalsky had vainly hunted on his last journeys. The pages given to this hunt read like a novel—so difficult and exciting was the killing of two of these cautious animals, out of a herd of seven individuals who came at night to drink in a small salt lake, and whose security was most vigilantly watched by an old male.

The first specimen secured was about ten years old. The wild horse has something in common with the Altai, Caucasian, and Finnish ponies: it is of a short stature (1·46 metre high), and has a broad chest and back, a short, massive neck, and fine legs, as elegant as those of the race-horses, ending with broad hoofs. The head seems rather heavy in comparison to the body, but the wide forehead is handsome; the line from the forehead to the nose is straight, and the upper lip covers the lower lip. The tail, whose upper part has the colour of the body, while its point is black, is longer than the tail of the wild ass, but it is not entirely covered with hair. The mane begins in front of the ears, the longest hairs being in its middle part. In the scantiness of hair, the wild horse has also something in common with the Tekke Turcomane horse; but the killed specimen had a strange-looking pair of hard whiskers, about four centimetres long, running from the ears to the chin. The wild horse has a sandy colour in summer, and light brown in winter, with nearly white parts on the abdomen; the forehead and cheeks are darker than the remainder of the body, while the end of the snout is whitish. The legs and the mane (which hangs to the left) are black; the spinal mark hardly exists, and disappears in winter. As a rule the hair is short and glossy, but somewhat curly in the foals. A good photograph of the killed horse, in profile, is given by M. Grum Grzimailo.

The manners of life of the wild horse differ from those of the wild asses—the *djighetais* and the *kulans*. They stay, in preference, in the deserts, while the latter prefer the mountain regions. They march in Indian file when they feel danger, and leave in the desert their traces in the shape of well-marked paths, as they march from their retired abodes amidst the desert hillocks to their drinking-places. They neigh exactly as our horses, while the wild asses only bray, and they have the characteristic growling of our horses. The Mongols sometimes succeed in catching young foals, but they never could tame them.

From Guchen the expedition went to Hami and Turfan, the most important centre of the region, and the work under review contains very valuable data relative to the inhabitants of these two oases. From Turfan they moved southwards, exploring the Bei-shan mountains, and coming to several interesting conclusions concerning the relations between the Tian-shan and the southern highlands, which relations will be treated more fully in the next volume. In the south of Turfan they made the remarkable discovery of the Assa depression, near Lukchun, where the barometer stood so high that, on comparing its heights with the isobars for the corresponding days in other parts of Central Asia, General Tillo concluded that the level of this depression is about 170 feet *below* the level of the ocean. The two years' barometrical observations, subsequently made by one of the members of Roborovsky's expedition, have fully confirmed the above conclusion.

A map of the region, on a scale of twenty-seven miles to the inch, accompanies the work; and certain photographs—namely, of the Bogdo-ola lake and mountains, the wild horse, and the inhabitants of the oases—are very interesting. A list of the birds brought in by the expedition, which were described by F. D. Pleske in the *Mélanges Biologiques* of the St. Petersburg Academy of Sciences (vol. xiii.), as well as a list of the Lepidopteræ collected by the author, complete the volume. Other valuable collections are still in the hands of specialists.

P. K.

OUR BOOK SHELF.

Navigation and Nautical Astronomy. By F. C. Stebbing, Chaplain and Naval Instructor, Royal Navy. Pp. vii + 328. (London: Macmillan and Co., Ltd., 1896.)

MR. STEBBING'S "Navigation and Nautical Astronomy" is the most satisfactory treatise on the subject we have yet seen. The author's experience, as a man of university attainments, a naval instructor afloat, and Admiralty examiner at Greenwich, has enabled him to produce a book that meets the practical and theoretical requirements of the modern navigator without being overladen with perplexing disquisitions or elaborate and unnecessary formulæ.

The works we have hitherto come across generally run into one extreme or the other. The first group, of which

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we may take Raper's as a type, consists of excellent practical examples and methods, but is so deficient in explanation and theory that a student could not obtain any grasp of the principles involved without the assistance of some friendly tutor. This is a serious objection if we consider the need of amended methods to meet the present increased speed of ocean transit and the consequent emergencies.

The other group, following on French lines, is so lumbered with investigations of a high mathematical order as to be quite beyond the comprehension of the average sailor.

Jean, who made an attempt to combine the two, produced two volumes of good matter, but ill-arranged and cumbersome. He has, in addition to the versine method, five difficult and different ways of "clearing the lunar distance."

We are glad to see that Mr. Stebbing has taken to heart the fable of the cat and the fox, and in every astronomical problem has selected the method in general use among the advanced school, and has explained and solved his problem by that method, and that only. His book is therefore of modest dimensions, and any student of average intelligence can read it and comprehend it unaided.

The comparatively small number of first-class navigating officers is in itself a conclusive proof that the art of navigation is much more intricate than a casual run through the subject would lead us to suppose. Long experience and special advantages are necessary to graduate as an instructor in this branch of science, and we therefore all the more welcome Mr. Stebbing, who happens to possess these special requirements, as a guide to our sailors of the present and the future.

The Distribution of Rain over the British Isles during the Year 1895. Compiled by G. J. Symons, F.R.S., and H. Sowerby Wallis. Pp. 237. (London: Edward Stanford, 1896.)

MR. SYMONS'S staff of voluntary observers now numbers 3084, having grown from 168 in the year 1860. Of these observers, 2304 have their stations in England, and only 398 in Scotland—a disproportion which is to be regretted. The large number of private stations where good records of rainfall are kept, is a striking testimony to the interest taken in local meteorology.

The present report contains an interesting article on Seathwaite as a rainfall station. The first systematic records of the rainfall at that place were made in 1845, so the station attained its jubilee in 1894. The following conclusions concerning this very wet spot are stated by Mr. Symons: (1) The rainfall at Seathwaite is on the average 135 inches a year. (2) In the wettest year it has exceeded 182 inches, and may possibly reach 190 inches. (3) In the driest year it has fallen to 88 inches, and will probably never be less. (4) In one month (November 1861) more than 35 inches fell. (5) In September 1894, very little more than half an inch fell. (6) There are nine recorded cases of more than six inches falling on one day—probably there have been about a dozen—the heaviest recorded was 7·52 inches on November 26, 1861.

Several plates illustrating Seathwaite, and the positions and patterns of the rain gauges, accompany the article.

In another article in the present volume systematic percolation experiments carried on at Apsley Mills, Hemel Hempstead, are described and discussed. Gauges were sunk in sand, chalk and earth, to measure the percolation at depths of 3 feet and 5 feet in each case. The result of the whole of the observations is, with a probable error of less than 2 per cent., "that with a rainfall of 26 inches, 16 inches percolate through 5 feet of sand, and 10 inches are evaporated from it; and that 12 inches soak through 5 feet of chalk or earth, and the other 14 inches either evaporate or run off the surface." The differences between the results obtained by the gauges at 3 feet and 5 feet were very small. The loss by evaporation is found by Mr. Symons to follow very nearly the same monthly variation as that from a water surface, but is decidedly less.

There are several other articles on various branches of rainfall work, and they help to make the new issue of "British Rainfall" an interesting volume.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Total Solar Eclipse of August 9, 1896, as observed in a Cloudless Sky at Bodö.

As Bodö was considered as offering conditions not favourable for serious work, this pretty town, so easily accessible for the greater number of European astronomers, was left unprovided with any astronomical instrument. And yet that town was, during the eclipse, favoured by a cloudless sky, which could have given magnificent results. I had the good fortune to observe there the wonderful phenomenon, and to make (what was chiefly my purpose) a sketch of the general outline and the rays of the corona. I do not think that among the thousands of Norwegians who witnessed that grand spectacle there were more than twenty foreigners, almost all English and American ladies and gentlemen.

The place we selected was on a hill at Brevig on the Saltenfjord, near Bodö, which hill had been found on May 3, when the sun was as high as on August 9, to be well situated for the eclipse observation. The weather on the previous days had been fine and very promising, and on the night of August 9 was even more splendid than before. On seeing the sun rise wholly clear from behind the mountains, no trace of the smallest cloud spoiling the clearness of the sky, an enthusiastic "hurrah!" arose from the numerous gathering on the hill.

Two minutes past 4 o'clock we first saw that the sun's edge, in the northern hemisphere and on the right-hand side, was hidden by the moon. Little by little the sun's disc was covered more and more, but the amount of light did not sensibly diminish until more than three-fourths of the disc were obscured. The darkness gradually increased, for the moment of the total eclipse was approaching. How slowly the seconds seemed now to pass, and how quickly after the first moment of totality! That impressive moment occurred at 4.54. Then at once we saw the moon of almost inky darkness encircled by the white corona. The corona was not at all regular. Its most peculiar feature was the total absence of any ray or streamer in the vicinity (± 25° W. and E.) of the sun's North Pole. Over the South Pole the corona was also a little less extensive than in the middle latitudes, where the greatest accumulations were to be seen in two enormous wings on both sides of the dark, empty space over the North Pole. The only colour I observed was the pink colour of the chromosphere around the edge of the moon (and less, also, at the sun's North Pole). In the chromosphere a few points (especially one at the left-hand, a little south from the equator) were blazing with dazzling brightness. Although the sudden apparition of Jupiter, Venus and Mercury, and, according to some observers, also of a star in the constellation Gemini, was very impressive, the darkness was not so great as I had expected, and did not hinder me in the least in beginning the sketch, which—not for want of light, but for want of the necessary calm of mind—I could only finish when all totality was over. The moments were too short and precious. I looked also an instant at the water in the fjord, and the snow-mountains on my left hand. The fjord was dull grey, the mountains pink at the bottom, and more yellowish at the top. The grass on our hill was dark olive-green.

At 4.55½ the sudden blazing up of a white point, quickly growing to a crescent at the right-hand side of the sun, proved that totality was over. At the first glimpse of sunlight, corona, chromosphere, and planets ceased to be visible to me.

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